ENVIRONMENTAL PROTECTION AGENCY

[X] CERCLA Approp. 68-20X8145

[ ] RCRA Approp. 682/30108

EPA CONTRACT NO.: 68-01-6769
CONTRACTOR: GCA Corporation
WORK ASSIGNMENT NO.: 83-8
NO. OF PAGES TO FOLLOW: none

x| Original Work Assignment |_| Work Plan Approval

| Work Assignment Amendment (A revised Work Plan |_| is |_| is not required.)

he Contractor shall furnish facilities, materials, and the necessary professional echnical, and supporting personnel for performance of the work required by this ork Assignment, described below.

RIORITY: |X| High |_| Medium |_| Low

ZARDOUS WASTE SITE IDENTIFICATION NUMBER: 3TGB815T06

ITLE: Consultation on the Reilly Tar case concerning ground water contamination

EVEL OF EFFORT (Direct Labor Hours): 32 (2 people)

ERIOD OF PERFORMANCE: 2 days: July 11 and 12, 1983

EFERENCE INFORMATION: |_| Attached |_| Transmitted Separately

|X| Not Applicable The Contractor is familiar with the case from past experience.

..TEMENT OF WORK SUMMARY :

Travel to Minneapolis and advise and consult with the Regional Coordinators on the ground water contamination at the Reilly Tar site in MN. All work will be at the direction of Mr. Paul Bitter.

EPORTING REQUIREMENTS: |X| Briefing(s) |_| Draft Final Report |_| Other

ROJECT OFFICER: Julie A. Klaas PHONE NO. (202) 382-4842 (FTS)

ONTRACT NEGOTIATOR: Alan Trail 30 June 83 PHONE NO. (202) 382-3195 (FTS)

ORK ASSIGNMENT MANAGER
HEADQUARTERS: Michael Kosakowski PHONE NO. 382-4814

REGIONAL CONTACT: Paul Bitter PHONE NO. 312-886-3007

CONTRACTING OFFICER

7/11/83
DATE

ENVIRONMENTAL PROTECTION AGENCY

[X] CERCLA Approp. 68-20X8145

[ ] RCRA Approp. 682/30108

EPA CONTRACT NO.: 68-01-6769
CONTRACTOR: GCA Corporation
WORK ASSIGNMENT NO.:
NO. OF PAGES TO FOLLOW: 4

[X] Original Work Assignment [ ] Work Plan Approval

[ ] Work Assignment Amendment (A revised Work Plan [ ] is [ ] is not required.)

The Contractor shall furnish facilities, materials, and the necessary professiona technical, and supporting personnel for performance of the work required by this Work Assignment, described below.

PRIORITY: [ ] High [X] Medium [ ] Low

HAZARDOUS WASTE SITE IDENTIFICATION NUMBER: 3 TGB 815T06

TITLE: Reilly Tar - Drilling Log Assessment /

LEVEL OF EFFORT (Direct Labor Hours): 727

PERIOD OF PERFORMANCE: 7 weeks

REFERENCE INFORMATION: [ ] Attached [X] Transmitted Separately

[ ] Not Applicable

STATEMENT OF WORK SUMMARY : Attached

REPORTING REQUIREMENTS: [ ] Briefing(s) [X] Draft Final Report [ ] Other

PROJECT OFFICER: Julie A. Klaas PHONE NO. (202) 382-4842 (FTS)

CONTRACT NEGOTIATOR: Alan Trail PHONE NO. (202) 382-3195 (FTS)

WORK ASSIGNMENT MANAGER
HEADQUARTERS: Michael Kosakowski PHONE NO. 202 382 5611

REGIONAL CONTACT: Paul Bitter PHONE NO. 312 886 3007

CONTRACTING OFFICER DATE

CONTRACTOR ACKNOWLEDGEMENT OF RECEIPT DATE

An effort is now underway to construct borings and install piezometers for the purpose of defining the locations of organic fluid bodies. This drilling effort has been delayed pending the compilation of a series of approximately 300 standardized geologic logs for the Reilly Tar site and adjacent areas. It is the objective of the present task to work with the Minnesota Pollution Control Agency and the United States Geological Survey to compile and interpret the geologic logs so that work can proceed on the construction of borings and installation of piezometers.

PROJECT APPROACH

GCA will prepare a comprehensive evaluation of the Reilly Tar site geology based on approximately 300 soil boring logs. The work will be accomplished in four subtasks:

1. Preparation of Standardized Geologic Logs.
2. Preparation of Geologic Cross Sections and Contour Plots.
3. Assessment of Soil Boring Logs for Direct Evidence of the Presence of Coal Tar or Related Contaminants.
4. Correlation of Geologic Strata with Drilling Data such as Blow Counts.

Results of the four tasks will be presented in a final report which will include copies of standardized geologic logs, cross-sections, contour plots and plots of the distribution of coal tar. The final report will serve as a data base for future site characterization studies.

Subtask 1: Preparation of Standardized Geologic Logs

Ken LeVoir of the Minnesota Pollution Control Agency in Roseville Minnesota has a file of approximately 300 drillers logs for borings constructed at or adjacent to the Reilly Tar site. These borings were constructed over a period of many years by several drilling firms for a variety of purposes ranging from foundation studies to water well

installation and environmental studies. Marc Hult of the U.S. Geological Survey in St. Paul, Minnesota has established a standard classification system and nomenclature for the soils and bedrock in the Reilly Tar area.

A GCA staff geologist will work with Ken LeVoir in Roseville, for a two week period to compile as many standardized geologic logs as possible. It is anticipated that it will be possible to compile essentially all of the logs in that time period. A second GCA staff engineer/scientist will be assigned to MPCA in Roseville to determine locations and land surface elevations for all borings for which standardized geologic logs have been prepared. This will be accomplished according to the available USGS protocol supplemented by use of the MPCA two-foot contour interval topographic map and site visits as necessary. At the end of the two week assignment in Roseville, GCA staff will return to GCA with copies of the standardized logs for use in Subtask 2.

Subtask 2: Preparation of Geologic Cross Sections and Contour Plots

The objectives of this subtask are to:

- prepare preliminary cross sections for the purpose of checking the standardized logs for interpretive consistency;
- revise logs, as appropriate;
- prepare final geologic cross-sections showing the locations at all geologic strata which might control the movement of fluid bodies;
- prepare contour plots showing the elevation of geologic contacts (e.g., upper surface of lacustrine clay deposits) which might control the movement of the fluid bodies.

This work will be performed at GCA using GCA computer facilities, both inhouse and time-shared, as appropriate.

Subtask 3: Assessment of Soil Boring Logs for Direct Evidence of the Presence of Coal Tar or Related Contaminants

GCA will review driller's logs and prepare a list of all references to the presence of coal tar or related compounds. The observations will be tabulated and cross-referenced to the standardized geologic logs. Locations of coal tar contamination will be plotted with separate plots for each geologic stratum in which contamination has been noted on drillers logs.

Subtask 4: Correlation of Geologic Strata with Drilling Data such as Blow Counts

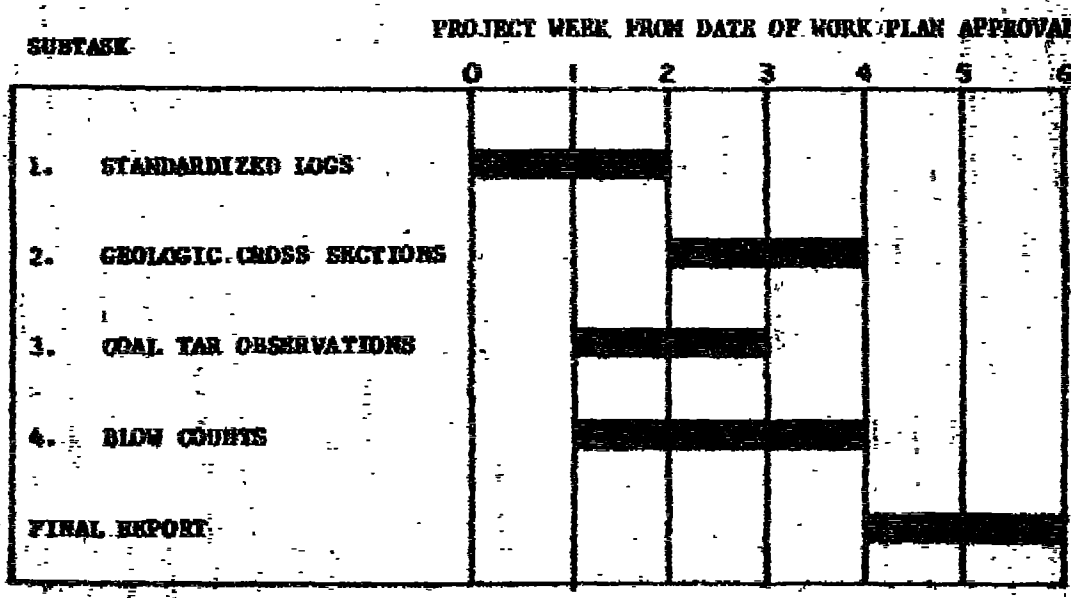
On occasion, driller's logs contain ambiguous or incomplete descriptions of soil strata. It is often possible to interpret other reported data such as blow counts and thereby determine the identities of the soil strata encountered. Such interpretations would be more easily accomplished if correlations were obtained for all available unambiguous data.

GCA will review driller's logs and standardized logs. Tabulations of blow count data for each geologic stratum will be prepared. Cumulative probability density functions will be plotted for each stratum. These plots will be used as aids in the interpretation of driller's logs, as required.

Final Report

GCA will prepare a comprehensive final report documenting task objectives, procedures, and results. The report will follow the outline presented in Section 2.0. Draft sections of the final report will be circulated to EPA, MPCA and USGS as early as possible so that GCA can incorporate as many comments as possible within the schedule limitations of the task.

SCHEDULE



3.0 PERSONNEL AND LEVEL OF EFFORT

Personnel

EPA Labor Category	Staff
P4	R. Wilder, D. Cogley
P2	D. Goode, T. Fitzgerald, P. Smith, P. Guidobro
P1	M. Stoughton
--	Secretarial

Level of Effort

Subtask		Technical Hours
1	Standardized Logs	150
2	Geologic Cross Sections	230
3	Coal Tar Observations	89
4	Blow Counts	107
Final Report		151
	Total	727

Appropriation No.	ENVIRONMENTAL PROTECTION AGENCY	EPA Contract No.: 68-01-6769
☒ CERCLA 68-20X8145 ☐ RCRA 682/30108 DCNo. AA0207	Technical Support for Enforcement at Hazardous Waste Sites	Contractor: GCA Corporation Work Assignment No 83-8 No. of Pages to Follow 0

☐ Original Work Assignment	☒ Work Plan Approval	☐ Work Assignment Amendment
	Approved without changes	Assignment Change No. ___ A revised Work Plan ☐ is ☐ is not required

The Contractor shall furnish facilities, materials, and the necessary professional, technical and supporting personnel for performance of the work required by this Work Assignment, described below

TITLE: Consultation on the Reilly Tar case concerning ground water contamination.

Priority		Government Est	Conractor Est	Reference Information
☐ High ☐ Medium ☐ Low	Level of Effort — Technical Labor Hours for Total Work Assignment	32	35	☐ Attached ☐ Transmitted Separately ☐ Not Applicable
	Period of Performance: Effective Date to Completion of Deliverables	7/11 - 12/83	7/11 - 12/83	
	Hazardous Waste Site Acct. No.	3TGB815T06		

Region	City:	State

Statement of Work Summary

Reporting Requirements. ☐ Briefing(s) ☐ Letter Report ☐ Draft Final Report ☐ Other

Project Officer. Julie A Klaas 23 Aug 83 Phone No (202) 382-4842 (FTS)

Contract Negotiator. Alan Trail Phone No (202) 382-3195 (FTS)

Work Assignment Manager: (name, address & phone No.) Michael Kosakowski EPA - OWPE 202/382-5611

Regional Contact: (name, address & phone No.) Paul Bitter EPA - Region 5 (Chicago) 312/886-3007

Contracting Officer — DATE (effective date)

Contractor Acknowledgement of Receipt (signature & title) — DATE

Sheet 1 White — Contracting Officer Copy (Washington, D C) Sheet 3 Green — GCA Copy
Sheet 2 Blue — Project Officer Copy (Washington, D C) Sheet 4 Yellow — Subcontractor Copy

ENVIRONMENTAL PROTECTION AGENCY

EPA CONTRACT NO: 68-01-6425
CONTRACTOR: Geraghty and Miller, Inc.
WORK ASSIGNMENT NO: 4
AMENDMENT NO: 1

☐ Original Assignment ☐ Work Plan Approval ☒ Work Assignment Amendment

☐ Work Plan Approval (conditional as attached)

Revised Work Plan ☐ is ☒ is not required.

WORK ASSIGNMENT

The Contractor shall furnish facilities, materials, and the necessary professional, technical, and supporting personnel for performance of the work required by this Work Assignment, described in the attached Statement of Work in accordance with the terms and conditions of the contract.

TITLE: Ground Water Contaminant Analysis for Reilly-Tar Case

	PREVIOUS	THIS ACTION	TOTAL
LEVEL OF EFFORT (Direct Labor Hours):	500	-432	68

PERIOD OF PERFORMACE: From Effective date To 12/31/82

CONTRACT SPECIALIST: Clark M. Hening Phone No. (202) 382-3203
Environmental Protection Agency
Headquarters Procurement Operations
401 M Street, SW (PM-214-F)
Washington, D. C. 20460

PROJECT OFFICER: Gerald F. Kotas Phone No. (202) 382-7595
Environmental Protection Agency
Office of Drinking Water
401 M Street, SW (WH-550)
Washington, D.C. 20460

WORK ASSIGNMENT MANAGER: Michael Kosakowski Phone No. (202) 382-4814
Environmental Protection Agency
Office of Waste Programs Enforcement
401 M Street, SW (WH 527)
Washington, D.C. 20460

APPROVALS

	Signature	Date
Task Manager	Michael W Kosakowski	5-10-83
Project Officer	Gerald F. Kotas	5/9/83
Contracting Officer		
	EFFECTIVE DATE: *	

*The EFFECTIVE DATE is the Contracting Officer's signature date unless otherwise specified.

CONTRACTOR ACKNOWLEDGEMENT OF RECEIPT

ENVIRONMENTAL PROTECTION AGENCY

EPA CONTRACT NO: 68-01-6425
CONTRACTOR: Geraghty and Miller, Inc.
WORK ASSIGNMENT NO: 4
AMENDMENT NO: 1

☐ Original Assignment ☒ Work Plan Approval ☐ Work Assignment Amendment

☐ Work Plan Approval (conditional as attached)

Revised Work Plan ☐ is ☐ is not required.

WORK ASSIGNMENT

The Contractor shall furnish facilities, materials, and the necessary professional, technical, and supporting personnel for performance of the work required by this Work Assignment, described in the attached Statement of Work in accordance with the terms and conditions of the contract.

TITLE: Ground Water Contaminant Analysis for Reilly-Tar Case

	PREVIOUS	THIS ACTION	TOTAL
LEVEL OF EFFORT (Direct Labor Hours):	500	0	500

PERIOD OF PERFORMACE: From Effective date To 12/31/82

CONTRACT SPECIALIST: Clark M. Hening Phone No. (202) 382-3203
Environmental Protection Agency
Headquarters Procurement Operations
401 M Street, SW (PM-214-F)
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PROJECT OFFICER: Gerald F. Kotas Phone No. (202) 382-7595
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WORK ASSIGNMENT MANAGER: Michael Kosakowski Phone No. (202) 382-4814
Environmental Protection Agency
Office of Waste Programs Enforcement
401 M Street, SW (WH 527)
Washington, D.C. 20460

APPROVALS

	Signature	Date
Task Manager	Michael W Kosakowski	5-10-83
Project Officer	Gerald F. Kotas	5/9/83
Contracting Officer	Clark M. Hening	5/11/83

EFFECTIVE DATE: * 5/11/83

*The EFFECTIVE DATE is the Contracting Officer's signature date unless otherwise specified.

CONTRACTOR ACKNOWLEDGEMENT OF RECEIPT

VIRONMENTAL PROTECTION AGENCY

EPA CONTRACT NO: 68-01-6425
CONTRACTOR: Geraghty and Miller, Inc.
WORK ASSIGNMENT NO: 4
AMENDMENT NO: 2

☐ Original Assignment ☐ Work Plan Approval ☒ Work Assignment Amendment

☐ Work Plan Approval (conditional as attached)

Revised Work Plan ☐ is ☒ is not required.

WORK ASSIGNMENT

The Contractor shall furnish facilities, materials, and the necessary professional, technical, and supporting personnel for performance of the work required by this Work Assignment, described in the attached Statement of Work in accordance with the terms and conditions of the contract.

TITLE: Ground Water Contaminant Analysis for Reilly-Tar Case

	PREVIOUS	THIS ACTION	TOTAL
LEVEL OF EFFORT (Direct Labor Hours):	500	-432	68

PERIOD OF PERFORMACE: From Effective date To 12/31/82

CONTRACT SPECIALIST: Clark M. Hening Phone No. (202) 382-3203
Environmental Protection Agency
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401 M Street, SW (WH-550)
Washington, D.C. 20460

WORK ASSIGNMENT MANAGER: Michael Kosakowski Phone No. (202) 382-4814
Environmental Protection Agency
Office of Waste Programs Enforcement
401 M Street, SW (WH 527)
Washington, D.C. 20460

APPROVALS

	Signature	Date
Task Manager	Michael W Kosakowski	5-10-83
Project Officer	Gerald F. Kotas	5/9/83
Contracting Officer	Carl M. Hening	5/11/83
	EFFECTIVE DATE:	*

*The EFFECTIVE DATE is the Contracting Officer's signature date unless otherwise specified.

CONTRACTOR ACKNOWLEDGEMENT OF RECEIPT

GCA CORPORATION
Technology Division

213 Burlington Road
Bedford Massachusetts 01730
Telephone 617-275-5444
Telex 92-3339

22 April 1983

Environmental Protection Agency
401 M Street, SW
Washington, DC 20460

Attention: Ms. Julie Klaas (WH 527F)
Office of Waste Programs Enforcement

Subject: Contract No. 68-02-3168, Work Assignment No. 78
(GCA 1-619-078)

Gentlemen:

In accordance with the reporting requirements of the subject Contract, enclosed herewith are three (3) copies of the Monthly Progress Report prepared hereunder covering the month of March 1983.

Very truly yours,

Arthur Engelman
Manager, Contract Administration

AE:eta

Enclosures (3)

cc: Malcolm Huneycutt
(w/1 copy)

Alice Gagnon
(w/1 copy)

Mike Kosakowski (WH 527F)
(w/3 copies)

GCA CORPORATION
Technology Division

213 Burlington Road
Bedford, Massachusetts 01730
Telephone 617-275-5444
Telex 92-3339

1 April 1983

Environmental Protection Agency
Office of Waste Programs Enforcement
Hazardous Waste Management Division
401 M Street, SW
Washington, DC 20460

Attention: Mike Kosakowski

Subject: Contract No. 68-02-3168, Technical Service Area 3,
Work Assignment No. 78 (GCA 1-619-078)

Gentlemen:

In accordance with the requirements of the subject Work Assignment, enclosed herewith are six (6) copies of the Revision to the "Quality Assurance Project Plan for Soil Sampling at the Reilly Tar Site, St. Louis Park, Minnesota."

Very truly yours,

Arthur Engelman pat

Arthur Engelman
Manager, Contract Administration

Enclosures (6)

cc: Julie Klaas
(w/1 copy)

Alice Gagnon
(w/1 copy)

M. Huneycutt
(w/1 copy)

AE:jaf

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE 11/2/83

SUBJECT Contract No. 68-02-3168
Work Assignment 78

FROM P. A. Thomaier
Contracts Management Division (MD-33)

TO Julie Klaas (WH-547E)

GCA has requested approval to award the attached FFP subcontract in the amount of $48,207 to Baun Env. Labs under the subject Contract/Work Assignment.
mod 1, 2, 3

You are requested to provide to provide your written evaluation/comments on the following:

1. Is the proposed subcontract work within the work scope of the Work Assignment? yes
2. Are the proposed man-hours, labor mix, travel, materials, and other direct cost commensurate with the proposed subcontract work? yes
3. Do you concur with the proposed subcontract as a means of accomplishing part of the Work Assignment scope of work? yes

Please return this entire package to me, with your comments, and, if appropriate, your concurrence. Call me at FTS 629-3105 if you have any questions.

I concur with the placement of this subcontract.

Signature Julie A. Klaas

Comments:

Received: 12/2/83

The modifications to this contract are appropriate and the scope of work accurately reflects the modifications. Period of extension is also appropriate

[illegible] with revisions made in this sub contract -

12/7/83 Carl Bethke OSC
Reg. IV

EPA Form 1320-6 (Rev. 3-76)

GCA TECHNOLOGY DIVISION

BURLINGTON ROAD
BEDFORD, MASSACHUSETTS 01730

SC 226B

SUBCONTRACT NO.	EFFECTIVE DATE	TYPE OF SUBCONTRACT	PAGE NO.
Modification No. 02 1-619-078-222-001A		Firm Fixed Price	1 OF

TO (SUBCONTRACTOR'S NAME AND ADDRESS)	ISSUED BY
Braun Environmental Laboratories, Inc. 6800 S. County Road P. O. Box 35108 Minneapolis, Minnesota 55435	GCA TECHNOLOGY DIVISION A DIVISION OF GCA CORPORATION 213 BURLINGTON ROAD BEDFORD, MASSACHUSETTS 01730 (617) 275-5444 GCA SUBCONTRACT ADMINISTRATOR Mary L. Atkinson

SUBCONTRACT PERIOD OF PERFORMANCE	TOTAL AMOUNT OF AWARD	GCA TECHNICAL
Eight (8) months	$48,200	Mr. Russell Wilder

SUBMIT INVOICES IN TRIPLICATE TO: DIVISION CONTROLLER
GCA TECHNOLOGY DIVISION, BURLINGTON ROAD
BEDFORD, MASS 01730 ATTN SUBCONTRACT NO
1-619-078-222-001A

DESCRIPTION:

WHEREAS, it is mutually agreed to modify the Statement of Work and Period of Performance provisions of this Subcontract.

NOW, THEREFORE, in consideration of the premises, the following modifications are hereby made:

1. Reference is made to ARTICLE II - Scope of Work. Exhibit A - Statement of Work is modified to change the second drilling phase to April-May 1983 and the maximum depth of borings is modified from 60 to 75 feet. As such, Revised Exhibit A dated 25 January 1983 is deleted in its entirety and attached Revised Exhibit A dated 29 March 1983 is substituted therefore.

2. As a consequence of the new work and the revised program schedule, the Period of Performance is extended from seven to eight months. As such, ARTICLE III -Period of Performance, Paragraph A is hereby deleted and the following substituted therefore;

"A. The period of performance for completion of the work set forth in ARTICLE II - Scope of Work, is eight (8) months from the effective date of this Subcontract."

3. All other terms and conditions remain unchanged.

SIGNATURE OF SUBCONTRACTOR		SIGNATURE FOR GCA TECHNOLOGY DIVISION	
NAME AND TITLE	DATE	NAME AND TITLE	DATE

GCA/TECHNOLOGY DIVISION
A DIVISION OF GCA CORPORATION
Bedford, Massachusetts 01730

29 March 1983

REVISED EXHIBIT A

STATEMENT OF WORK
(GCA 1-619-078-222-001A)

BACKGROUND

GCA is under contract to the U.S. Environmental Protection Agency to conduct a sampling and analysis program at the Reilly Tar Site located in St. Louis Park, MN. The objective of this program is to determine whether coal tar derivatives are present on the site. In order to obtain the samples for analysis, a number of wells will be installed in two phases during October-November 1982 and April-May 1983. GCA requires the services of a well drilling subcontractor in order to accomplish the requirements of this program. The Subcontractor will conduct the program delineated in the scope of work below.

SCOPE OF WORK

The Subcontractor will perform the following tasks:

Task 1 - Boring

1. General

a. Each boring shall be advanced using rotary drilling techniques. Change in crew from commencement to approved completion shall not be made except when such change is approved by the GCA Technical Field Representative (hereinafter, Technical Representative). The Subcontractor shall not abandon a boring before reaching the depth required by the Technical Representative; nor shall the casing or other apparatus be removed except with the permission of the Technical Representative. All drilling shall occur during daylight hours Monday through Friday. No drilling shall occur on Government holidays so that Government officials can observe all the work. If certain phases of work on a well must be continued into the hours of darkness, sufficient lighting shall be provided by the Subcontractor such that work may be carried out in a safe and efficient manner. The Subcontractor shall obtain all necessary permits and utility clearances as well as provide roadway signs as necessary to perform the work described herein.

b. The location of a water source for drilling shall be approved by the Technical Representative. The Subcontractor shall provide, install, and maintain sufficient pumps and water lines to ensure an adequate water supply for the work. The digging of sumps for drill water will not be permitted. Portable mud tubs will be required. Discharge water shall be controlled to prevent contamination, pollution, excessive erosion, and other damage. The place of discharge is to be designated by the Technical Representative.

GCA/TECHNOLOGY DIVISION
A DIVISION OF GCA CORPORATION
Bedford, Massachusetts 01730

29 March 1983

REVISED EXHIBIT A

2. Type

Borings will be selected as necessary for procuring split-spoon samples, thin-wall samples, installation of piezometers, and well development.

3. Number and Location

Eight (8) borings shall be drilled during the first phase at locations designated by the Technical Representative and shall be installed over a five (5) week period in October-November 1982. Thirteen (13) additional borings will be drilled during th second phase at designated locations and shall be installed over a seven (7) week period in April-May 1983.

4. Depth of Borings

Borings shall be advanced to the depths specified by the Technical Representative. The maximum depth of borings shall be advanced to bedrock, which is approximately 75 feet.

5. Installation

Borings shall begin with a 3.5" I.D. (or larger) hollow-stem auger fitted with a sampler taking samples approximately every 5 feet until the water table is encountered. The hollow stem auger shall be removed and 4-inch I.D. surface casing set to a depth of approximately 10 feet. Casings shall be flush-joint or flush-coupled heavy steel. Casings shall be advanced vertically through earth and other materials, including boulders, to the depth below the surface of the ground that is required to maintain the sides of the borehole, or as directed by the Technical Representative. The casings shall not be advanced ahead of the borehole, except as necessary to control the caving of the borehole walls. The hole shall be advanced by approximately 5-foot increments by taking a Shelby tube or split-spoon sample, drilling 3 feet with a Tri-cone bit and adding 5 feet of H-type casing. Below the ground water level, water or drilling fluid shall be maintained within the boring at or above the ground water level to prevent caving conditions and to prevent loss of circulation. The driling fluid shall be standard commercial bentonite mixed with clean water and shall not be recirculated. All mud and cuttings shall be disposed of in compliance with Minnesota Department of Health Requirements. No cuttings, chemicals, or other foreign materials shall be introduced into the hole. The Subcontractor shall be equipped with the hammer equipment necessary to drive the casing into the hole. The number of blows required to drive the casing each foot and the weight of the hammer and drop shall be recorded.

GCA/TECHNOLOGY DIVISION
A DIVISION OF GCA CORPORATION
Bedford, Massachusetts 01730

29 March 1983

REVISED EXHIBIT A

Task 2 - Piezometer Construction

a. Location--The Subcontractor will be required to install piezometers at twelve (12) locations to be selected by the Technical Representative in the manner described herein (Figure 1).

b. Drilling--The piezometers shall be drilled straight, plumb, and free of any obstructions to permit easy installation of the well casing. Faulty alignment of the drilled holes shall be corrected at the Subcontractor's expense.

c. Depth--The piezometers shall be installed inside a 4-inch minimum diameter hole and to a depth specified by the Technical Representative.

d. Pipe and Screen--The piezometers shall be 2 inch I.D. galvanized steel, threaded and coupled, steam-cleaned, and in lengths of not more than 10.5 feet. The perforated interval shall consist of a 3-foot long by 2-inch (I.D.) wire wound screen, No. 10 slot, galvanized steel and fitted with a 1-foot sump section with a plug at the bottom. This section shall be installed at the bedrock/drift boundary (Platteville Limestone).

e. Filter Envelope Specifications--The filter envelope (gravel pack) shall be composed of either Morie No. 0 sand, supplied by Jessie S. Morie & Son, Inc., Morristown, New Jersey, 03239, Ottawa sand, or approved equal as determined by the Technical Representative.

f. Washing--The drilled holes shall be thoroughly washed to clean any sediment that may have built up on the hole wall during drilling. Additionally, clear water shall be circulated through the perforated pipe, returning to the surface in the annular space, prior to placing the filter envelope. Washing shall continue in holes while placing the filter envelope, until the return water is free of soil particles.

g. Placing Seals, Filter Envelope and Grout--The piezometer shall be firmly seated in 1 foot of bentonite pellets. Care shall be taken that most of this seal covers the perforated interval. The gravel pack shall be placed to 2 feet above the perforated interval. The annular space immediately above the gravel pack shall be filled with a mixture of six parts cement and one part bentonite. This seal shall be 1 foot thick. Immediately above this seal to 1 foot below the surface shall be filled with grout. The H-casing shall be removed as seals, gravel pack and grout are placed to assure that no voids remain in the annular space around the pipe and to prevent the pipe from becoming sand-locked in the casing.

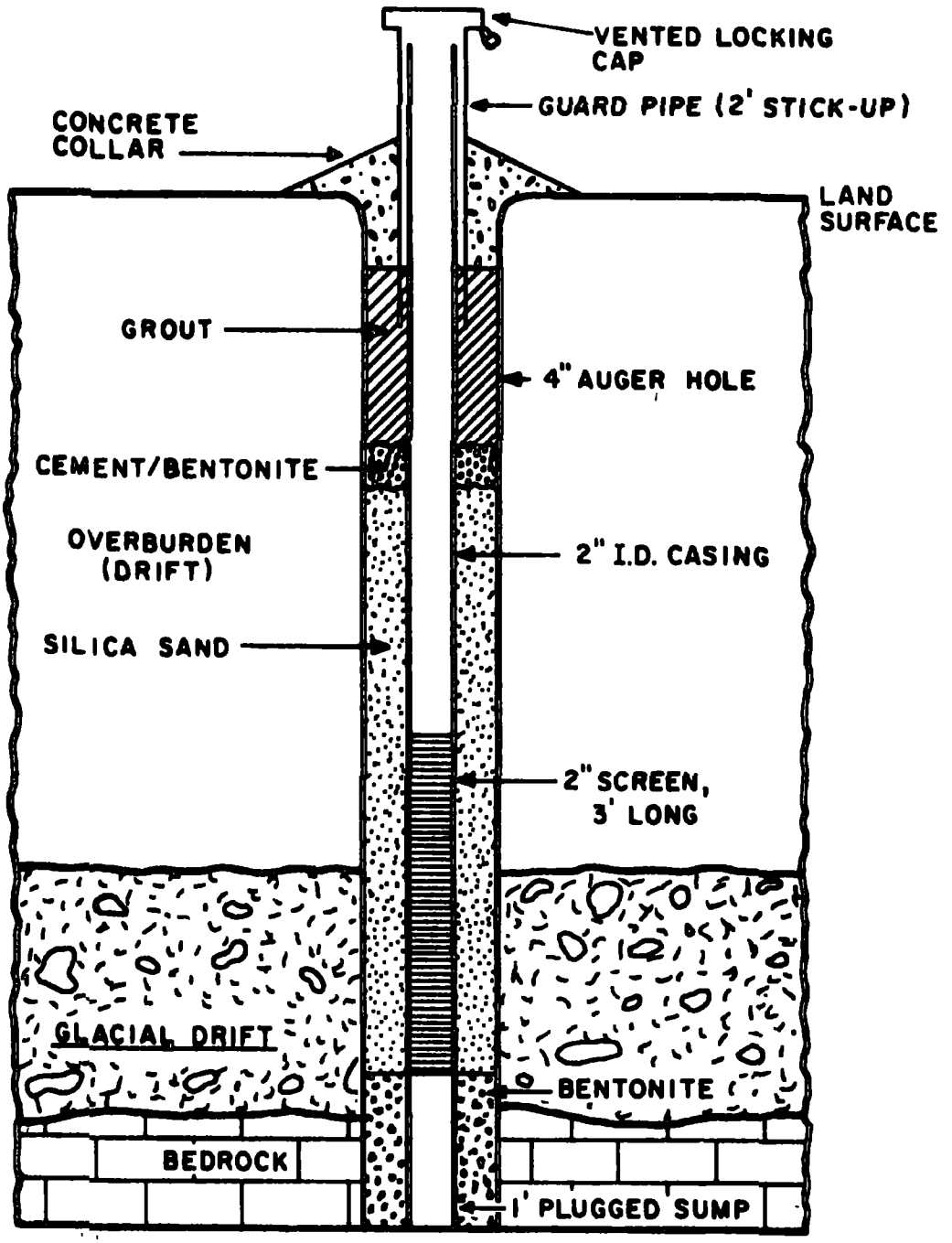

Figure 1. Typical completed piezometer for the Reilly Tar Site.

GCA/TECHNOLOGY DIVISION
A DIVISION OF GCA CORPORATION
Bedford, Massachusetts 01730

29 March 1983

REVISED EXHIBIT A

h. Surface Seal and Protection--A 7 foot piece of 4-inch minimum diameter guard pipe with vented locking cap shall be left in place and shall be permanently cemented at ground surface to protect the riser pipe. The top of the pipe shall extend 2 feet above the ground surface. Concrete shall be set around the perimeter of the pipe and shall extend into the annular space in the borehole approximately 1 foot. The collar shall extend above the ground surface approximately 4 inches and shall slope away from the guard pipe to prevent surface water from collecting around the piezometer.

i. Piezometer Testing--Upon completion and prior to moving the drill rig, the Subcontractor shall lower the water level in each piezometer by bailing or pumping to the lowest practical depth. This depth shall be recorded to ensure proper operation. The well development shall be done under the supervision of the Technical Representative.

j. Abandoned Holes--Any test hole or piezometer that does not satisfy the requirements herein described, and which the Subcontractor cannot make acceptable, will be declared an abandoned hole. All abandoned test holes shall be filled by the Subcontractor according to the Minnesota Department of Health standards.

k. Survey--The top of each piezometer shall be spirit-leveled to the nearest 0.01 foot above mean sea level. Land surface elevations shall be determined to the nearest 0.1 foot above sea level. Leveling shall be done in closed loops beginning at piezometers or benchmarks of known elevation and as provided by the Government in "Elevations and Level Summary, St. Louis Park, Minnesota," Revised 9/1/81. Reference points are available within 1000 feet of the sites.

l. Site Restoration--The Subcontractor shall attempt to avoid damage in connection with his drilling operations. If there is not sufficient cleared area for efficient operations he shall consult with the Technical Representative. At the completion of drilling, piezometer installation, and well development, and before acceptance by the Technical Representative, the site shall be restored as nearly as possible to its previous condition. All equipment shall be removed, holes filled in, and debris removed in accordance with requirements of the Minnesota Pollution Control Agency (MPCA). The work specified in this Subcontract will not be considered complete until the site restoration is completed to the satisfaction of the Technical Representative.

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Task 3 - Sampling

1. General

a. Cores of the materials penetrated during boring operations shall be collected at intervals of approximately 5 feet, at changes in lithology, and at depths directed by the Technical Representative, who will also determine the type of sampler to be used for each sample.

2. Split-Spoon Sampling

a. Three-inch I.D. split spoon samplers shall be used. In order to facilitate extrusion of the cores from the liners, the Subcontractor shall provide a special tip such that the internal diameter of the tip is reduced by twice the thickness of the liner wall. In addition, the Subcontractor shall supply a commercial, spring loaded retaining ring which, at the direction of the Technical Representative, shall be inserted between the barrel and the sampler tip. All split-spoon samplers shall be fitted with segmented brass or stainless steel liners. The liners shall consist of three segments of 6, 12, and 6 inches each to be provided by the Subcontractor. The samplers and liners shall be thoroughly washed in water and rinsed in hexane in the laboratory of the Subcontractor prior to each use. The split-spoon sampler shall be washed with clean water and both the sampler and the liners rinsed in hexane provided by the Subcontractor in the field immediately prior to use. After the sample is taken and the liner is removed from the sampler, the Subcontractor shall store the liners in a clean, enclosed work area provided by the Subcontractor. In the clean area, the Subcontractor shall extrude the sample into clean sterile, labeled, glass jars provided by the Subcontractor. The Technical Representative will then proceed to log the core samples. After logging, the Subcontractor shall store the jars in dry ice until shipment. Samples with excessive amounts of moisture shall be partially frozen with dry ice prior to extrusion from the liner sections.

b. The sampler shall be driven by a 300-pound hammer having a 30-inch drop. The number of blows required for each 6 inches of penetration shall be recorded by the Subcontractor for every 24 inches of penetration. The Subcontractor shall supply certification of the 300-pound hammer.

c. Once every 2 weeks, the Subcontractor shall ship the processed cores packed with dry ice and packaged in conformance with EPA National Enforcement Investigation Center (NEIC) and Department of Transportation (DOT) requirements. Prepaid shipment shall be made in locked coolers via DOT-approved carrier to GCA/Technology Division, 213 Burlington Road, Bedford, Massachusetts 01730 (Attention: Sample Bank).

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3. Thin-Wall Sampling

a. At locations and depths to be determined by the Technical Representative, undisturbed samples shall be taken with a thin-walled, open drive tube sampler.

b. The 3-inch (O.D.) by 36-inch samplers shall be constructed of seamless steel, with a 14 gauge wall thickness, and a bit clearance not greater than 0.5 percent.

c. The drill rig shall be provided with a hydraulic pressure device capable of exerting a driving force of 8,000 pounds.

d. The sampling tube and sampler head shall be smooth and thoroughly cleaned inside and outside before sampling and shall be in proper working condition. The tube edge shall be properly sharpened and have the correct inside clearance for the soil being sampled.

e. The drive shall be made without rotation and with a continuous stroke. No additional drive shall be attempted after the sampler stops.

f. The sampler containing the soil sample shall be carefully removed from the hole and shipped to the Subcontractor's Laboratory for testing. For this purpose, the tube ends shall be sealed with expanding packers.

Task 4 - Laboratory Testing

1. General

a. The Subcontractor shall perform physical measurements on selected thin-wall tube corings at the direction of the Technical Representative. The laboratory tests listed herein shall be performed in accordance with the appropriate ASTM(1), or equivalent, standard methodology.

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(1) ASTM methods as delineated in "1982 Annual Book of ASTM Standards," Part 19.

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2. Measurements

a. Vertical column conductivity measurements using constant or falling head method as appropriate to the grain size. Method employed shall be EM 1110-2-1906,(2) Appendix VII, or approved equivalent.

b. Horizontal column conductivity measurements using the same methodology as in item (a) above.

c. Total organic carbon. EPA Method 415.1,(3) or approved equivalent.

d. Particle size. ASTM Method D-422(1) for sieving and hydrometer.

e. Porosity. Method EM 1110-2-1906,(2) Appendix II, or approved equivalent.

Task 5 - Boring Log Data

The Subcontractor shall assemble from his files the boring logs from holes located in the vicinity of Highway 7 and the swamp located directly south of the Reilly Tar site. Necessary written authorizations from the Minnesota Department of Transportation and other clients shall be obtained prior to reproducing the logs and transmitting them to the Minnesota Pollution Control Agency (MPCA). A duplicate set of boring logs shall be transmitted simultaneously to the Prime Contractor Technical Monitor. This task shall be completed within two (2) weeks of authorization to proceed by the Prime Contractor.

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(1) ASTM methods as delineated in "1982 Annual Book of ASTM Standards," Part 19.

(2) EM Methods as delineated in U.S. Army Corps of Engineers "Engineers Manual EM 1110-2-1906, Laboratory Soil Testing.

(3) EPA Method as delineated in "Chemical Analysis of Water and Wastes," EPA-600/4-79-020.

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SAFETY PLAN

The Subcontractor shall adhere to the Safety Plan attached as Appendix A. The Subcontractor is responsible for the health and safety of its employees. The Prime Contractor will be exercising its own safety plan at this site for its employees independent of the Subcontractor's program.

CHAIN OF CUSTODY/QUALTIY ASSURANCE

The Subcontractor shall follow the Quality Assurance procedures for sampling and testing as set forth in Appendix B. These procedures are subject to periodic review throughout the performance of this Subcontract by the Prime Contractor Quality Assurance Manager, Ms. Rosemary Ellersick.